ATSC Standard:
Service Usage Reporting

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ATSC Standard: Service Usage Reporting

1. SCOPE

The normative portions of this document define a standard for service usage reporting for ATSC 3.0.

1.1 Organization

This document is organized as follows:

- Section 1 – Outlines the scope of this document and provides a general introduction.
- Section 2 – Lists references and applicable documents.
- Section 3 – Provides a definition of terms, acronyms, and abbreviations for this document.
- Section 4 – Service Usage Reporting
- Annex A – Schema

2. REFERENCES

All referenced documents are subject to revision. Users of this Standard are cautioned that newer editions might or might not be compatible.

2.1 Normative References

The following documents, in whole or in part, as referenced in this document, contain specific provisions that are to be followed strictly in order to implement a provision of this Standard.

[1] ATSC: "ATSC Standard: Signaling, Delivery, Synchronization and Error Protection," Doc. A/331:2022-03, Advanced Television Systems Committee, Washington, DC, 31 March 2022.
[2] IEEE: "Use of the International Systems of Units (SI): The Modern Metric System", Doc. IEEE/ASTM SI 10, Institute of Electrical and Electronics Engineers, New York, NY, 2002.
[3] ATSC: "ATSC Standard: Content Recovery in Redistribution Scenarios," Doc. A/336:2022-03, Advanced Television Systems Committee, Washington, DC, 31 March 2022.
[4] ISO: ISO 3166-1:2013 (E/F), "Codes for the representation of names of countries and their subdivisions — Part 1: Country codes," International Organization for Standardization, 3rd Edition, 11/13/2013.

3. DEFINITION OF TERMS

With respect to definition of terms, abbreviations, and units, the practice of the Institute of Electrical and Electronics Engineers (IEEE) as outlined in the Institute's published standards [2] shall be used. Where an abbreviation is not covered by IEEE practice or industry practice differs from IEEE practice, the abbreviation in question will be described in Section 3.3 of this document.

3.1 Compliance Notation

This section defines compliance terms for use by this document:

shall – This word indicates specific provisions that are to be followed strictly (no deviation is permitted).

shall not – This phrase indicates specific provisions that are absolutely prohibited.

should – This word indicates that a certain course of action is preferred but not necessarily required.

should not – This phrase means a certain possibility or course of action is undesirable but not prohibited.

3.2 Treatment of Syntactic Elements

This document contains symbolic references to syntactic elements used in the audio, video, and transport coding subsystems. These references are typographically distinguished by the use of a different font (e.g., restricted), may contain the underscore character (e.g., sequence_end_code) and may consist of character strings that are not English words (e.g., dynrng).

3.2.1 Reserved Elements

One or more reserved bits, symbols, fields, or ranges of values (i.e., elements) may be present in this document. These are used primarily to enable adding new values to a syntactical structure without altering its syntax or causing a problem with backwards compatibility, but they also can be used for other reasons.

The ATSC default value for reserved bits is '1.' There is no default value for other reserved elements. Use of reserved elements except as defined in ATSC Standards or by an industry standards setting body is not permitted. See individual element semantics for mandatory settings and any additional use constraints. As currently-reserved elements may be assigned values and meanings in future versions of this Standard, receiving devices built to this version are expected to ignore all values appearing in currently-reserved elements to avoid possible future failure to function as intended.

3.3 Acronyms and Abbreviation

The following acronyms and abbreviations are used within this document.

ATSC – Advanced Television Systems Committee

CDM – Consumption Data Message

CDU – Consumption Data Unit

JSON – JavaScript Object Notation

URCR – Usage Reporting-Capable Receiver

UTC – Coordinated Universal Time

3.4 Terms

The following terms are used within this document.

Application – A collection of documents constituting a self-contained enhanced or interactive service. The documents of an application can include HTML, JavaScript, CSS, XML and multimedia files. An application can access other data that are not part of the application itself. An Application is a special case of a locally cached content item and can be delivered via broadcast or broadband.

Long-term storage – A location in memory used to store a recording of a program with the intention of playback at a later date and time. This memory is persistent through power cycles of the device.

reserved – Set aside for future use by a Standard.

Time-shift-buffer – A buffer of memory used to record a temporary, fixed duration of the program being presented for the purposes of skipping ahead, skipping back, pausing, or resuming playback of a broadcast.

4. SERVICE USAGE REPORTING

4.1 System Overview

A service usage data gathering system consists of three main area:

- Service usage information collection
- Service usage information storage (persistent or transient)
- Reporting the stored information A service usage data gathering system broadly consists of two main functions:

1) Client – A service usage data client in each device. The client manages the functions of service consumption data collection, storage and transmission to the servers over the broadband channel.
2) Server – Service usage data server systems operated by (or on behalf of) service providers, either individually or in groups. These servers collect the data consumed by clients and may provide input to recommendation engine systems and generate reports.

The Usage Reporting Capable Receiver (URCR) performs an optional receiver function which allows it to interoperate with service usage data server systems operated by (or on behalf of) service providers. A receiver that supports the URCR function shall implement the requirements specified herein.

4.2 Specification

This section provides the normative specification of URCR receiver functionality.

4.2.1 Consumption Data Unit (CDU)

The fundamental record that captures consumption information is called a Consumption Data Unit (CDU). For a streaming A/V channel, each CDU identifies a reporting interval during which a service is accessed. Such a CDU includes the service identifier, the time the service access started and the time the service access ended. If any Applications are active during the report interval, it also records when the Applications are active (whether on a primary device or a "second screen", companion device), including the Application Identifier, the time the Application started being active, and the time it stopped being active.

For services, events logged into a CDU shall correspond to all usage intervals of no less than 10 seconds and may correspond to shorter usage intervals. For Application activity, events logged into a CDU shall correspond to all usage intervals of no less than 5 seconds and may correspond to shorter usage intervals. The precision and accuracy of start times and end times in the CDUs should be within 1 second.

4.2.2 Consumption Data Message

The fundamental data structure used to transmit CDUs from a service usage data client to a service usage data server is called a Consumption Data Message (CDM). A CDM can contain data for a single service, or it can contain data for multiple services in the case that data for multiple services is being reported to the same service usage data server.

4.2.2.1 CDM Format

A CDM shall be a JSON document conforming to the JSON schema defined in Annex A:. The definition of this schema is also in a schema file accompanying this standard.

While the indicated schema file gives the normative definition of the JSON schema definition of the CDM, Table 4.1 below describes the structure of the CDM in a more illustrative way. The semantic definitions of the fields in Table 4.1 appear immediately after Table 4.1.

Table 4.1 CDM Logical Structure (*next page*)

Field	Cardinality	Description
CDM	1	Consumption Data Message
protocolVersion	1	Major and minor version of CDM protocol
DeviceInfo	1	Consumption Device information
deviceID	1	Consumption device identifier
deviceModel	1	Consumption device model
deviceManufacturer	1	Consumption device manufacturer
deviceOS	1	Consumption device Operating system and version
peripheralDevice	1	Indication if the consumption device is a peripheral device.
deviceLocation	1	Consumption device last known location
latitude	1	Latitude information
longitude	1	Longitude information
clockSource	0..1	Indicates whether the device clock has been set manually by the user or automatically by a service.
AVService	0..N	
country	1	ISO 3166-1 alpha-2 [4] country code associated with the primary administrative entity under which the given bsid is assigned.
bsid	1	Identifier of the entire broadcast stream
serviceID	1	service identifier that identifies this Service within the scope of this Broadcast area.
globalServiceID	1	A globally unique URI that identifies the ATSC 3.0 Service.
serviceType	1	Type of service
reportInterval	1..N	Reporting interval
startTime	1	Start time of reporting interval
endTime	1	End time of reporting interval
DestinationDeviceType	1	Destination device type
ContentID	0..1	
type	1	Defined values: “EIDR” or “Ad-ID”
cid	1	Patterned string
broadcastInterval	1..N	Interval of content that is presented at a particular speed
broadcastStartTime	1	Start time of the interval when content is presented at a particular speed on the broadcast timeline
broadcastEndTime	1	End time of the interval when content is presented at a particular speed on the broadcast timeline
speed	0..1	A floating point number that indicates the playback speed
receiverStartTime	1	Start time of the interval when content is presented at a particular speed on the receiver timeline
Component	1..N	Individual content components within a given channel
componentType	1	Type of the component (e.g. audio, video, closed caption, etc.)
componentRole	1	Role of the component
componentName	0..1	Human readable name of the component
componentID	1	Component ID
componentLang	0..1	Component Language

				startTime		1	Start time of the interval when content component is presented
				endTime		1	End time of the interval when content component is presented
				SourceDeliveryPath		1..N	Delivery path used for or the source of the content component being consumed
					type	1	Type of delivery path used for or source of the content component being consumed
					startTime	1	Start time of the interval when content component is received via indicated delivery path or from the source
					endTime	1	End time of the interval when content component is received via indicated delivery path or from the source
			AppInterval			0..N	Interval of active Application
				appId		1	Application identifier
				startTime		1	Start time of interval
				endTime		1	End time of interval
				LifeCycle		1	Application Lifecycle
				Tags		1	Application tags

protocolVersion – This field shall contain the major and minor protocol versions of the syntax and semantics of the CDM, coded as hexadecimal values each in the range 0x0 to 0xF. The overall **protocolVersion** will be coded as a concatenated string of the form "0x<major protocol version as hexadecimal digit><minor protocol version as hexadecimal digit>". A change in the major version level shall indicate a non-backward-compatible level of change. The initial value of this field shall be 0. The value of this field shall be incremented by one each time the structure of the CDM is changed in a non-backward compatible manner from a previous major version. The second number is the CDM's minor version, which shall represent the minor version of the syntax and semantics of the CDM. A change in the minor version level for each value of the first number shall indicate a backward-compatible level of change within that major version. The initial value is 0. The value of this field shall be incremented by one each time the structure of the CMD is changed in backward-compatible manner from a previous minor change (within the scope of a major revision).

DeviceInfo – The consumption device information.

DeviceInfo.deviceID – A field that shall identify the consumption device identifier. A value of "NOTREPORTED" indicates that the consumption device identifier is intentionally not revealed.

DeviceInfo.deviceModel – A field that shall identify the consumption device model (e.g., XYZ-NG3400). A value of "NOTREPORTED" indicates that the consumption device model is intentionally not revealed.

DeviceInfo.deviceManufacturer – A field that shall identify the consumption device manufacturer (e.g. ABC company). A value of "NOTREPORTED" indicates that the consumption device manufacturer is intentionally not revealed.

DeviceInfo.deviceOS – A field that shall identify the consumption device operating system and version (e.g. iOS 9.0.2, Android 5.0.1). A value of "NOTREPORTED" indicates that the consumption device operating system is intentionally not revealed.

DeviceInfo.peripheralDevice – A field that shall identify if the consumption device is an external peripheral (e.g. a ATSC tuner dongle). A value of "NOTREPORTED" indicates that it is intentionally not revealed if the consumption device is external peripheral or not.

`DeviceInfo.deviceLocation` – An object that shall identify the last known location of the consumption device.

`DeviceInfo.deviceLocation.latitude` – A field that shall contain the latitude of the last known device location coded in decimal degrees format (e.g. "[+–]DDD.DDDDD") as a string. A value of "NOTREPORTED" indicates that the device location is intentionally not revealed.

`DeviceInfo.deviceLocation.longitude` – A field that shall contain the longitude of the last known device location coded in decimal degrees format (e.g. "[+–]DDD.DDDDD") as a string. A value of "NOTREPORTED" indicates that the device location is intentionally not revealed.

`DeviceInfo.clockSource` – An unsigned integer that shall contain the source of the time that has been set in the device clock.

0 – device clock has been set manually by the user

1 – device clock has been set automatically by a service

`AVService` – This element contains the list of zero or more elements describing activity intervals based on content delivered continuously.

`country` – Country code associated with the primary administrative entity under which the value provided in `bsid` is assigned, using the applicable alpha-2 country code format as defined in ISO 3166-1 [4].

`bsid` – Identifier of the whole broadcast stream. The value of `bsid` shall be equal to the value `@bsid` for the service in Service List Table of A/331 [1].

`serviceID` – This value of `serviceID` identifies the service associated with the usage data in this `AVService` element. The value of `serviceID` shall be equal to the value `@serviceId` for the service in Service List Table of A/331 [1].

`globalServiceID` – This globally unique URI identifies the service associated with the usage data in this `AVService` element. The value of `globalServiceID` shall be equal to the value of `userServiceDescription@globalServiceID` for this service in User Service Bundle Description (either for ROUTE or MMT) of A/331 [1].

`serviceType` – The value of the field `@serviceCategory` as defined in Service List Table of A/331 [1] that is (or was - for time shifted content) present in the associated service instance being reported.

`reportInterval` – One or more periods of display of content for this `AVService`.

`reportInterval.startTime` – The UTC `dateTime` at the beginning of the event. Intervals shall begin when display of the content begins.

`reportInterval.endTime` – The UTC `dateTime` at the end of the event. Intervals shall end when display of the content ends.

`DestinationDeviceType` – An unsigned integer denoting the class of usage or device type (presentation device). Defined values are:

0 – Content is presented on a Primary Device

1 – Content is presented on a Companion Device

2 – Content is sent to a Time-shift-buffer

3 – Content is sent to a Long-term storage

4 to 255 – Reserved.

`ContentID` – This field shall identify the content associated with this instance of `reportInterval`. This field is required if the ContentID is available to the device.

`ContentID.type` – A field that is required when `ContentId` element is included. Two values are defined currently:

- "`EIDR`" indicates a content identification per the EIDR registry (http://eidr.org).
- "`Ad-ID`" indicates a content identifier per the Ad-ID registry (http://ad-id.org).

`ContentID.cid` – A field that is required when `ContentId` element is included that provides the content identification for this `reportInterval` element. The type of content identifier shall be as given in the `ContentID.type` attribute. Either an EIDR (34-character canonical form with hyphens) or Ad-ID (11 or 12-character canonical form) can be included.

`broadcastInterval` – An interval when content is presented at a particular speed.

`broadcastInterval.broadcastStartTime` – The UTC `dateTime` on the broadcast timeline at the beginning of the interval when content is presented at a particular speed indicated by **`broadcastInterval.speed`**.

`broadcastInterval.broadcastEndTime` – The UTC `dateTime` on the broadcast timeline at the end of the interval when content is presented at a particular speed indicated by **`broadcastInterval.speed`**.

`broadcastInterval.speed` – A floating point number that indicates the playback speed with the value:

=0 – indicates paused playback

>0 – indicates forward playback at the indicated speed. The value 1 indicates a playback at the normal speed, the value greater than 1 indicates fast forward playback and the value between 0 and 1 indicates slow forward playback

<0 – indicates backward playback at the indicated speed. The value -1 indicates backward playback at the normal speed, the value less than -1 indicates fast backward playback, and the value between 0 and -1 indicates slow backward playback

When `broadcastInterval.speed` is not included then it is inferred to be equal to 1.

The value of `broadcastInterval.speed` should be evaluated to the nearest 0.1 for the purposes of determining speed change or classifying trick modes.

The value of `broadcastInterval.speed` should be related to the other entries as follows:

(i-1)'th `broadcast.speed` should be equal to difference between (i-1)'th array entries `(broadcastInterval.broadcastEndTime-broadcastInterval.broadcastStartTime)` divided by the difference between i' th array entry `broadcastInterval.receiverStartTime` minus (i-1)'th array entry `broadcastInterval.receiverStartTime`

`broadcastInterval.receiverStartTime` – The UTC `dateTime` on the receiver timeline at the beginning of the interval when content is presented at a particular speed. Any of the value `receiverStartTime` shall not be less than the value of `startTime` property of this `reportInterval` instance and shall not be greater than the value of `endTime` attribute of this `reportInterval` instance. They shall obey following constraints:

- The value i'th array entry `broadcastInterval.receiverStartTime` shall not be less than or equal to value of (i-1)'th array entry `broadcastInterval.receiverStartTime.`
- The value of 1st array entry `broadcastInterval.receiverStartTime` shall be equal to the value `reportInterval.StartTime`.

  1 to N array entries for receiver timeline indicated by `broadcastInterval.receiverStartTime` shall span entire `reportInterval` period

from `reportInterval.startTime to reportInterval.endTime` in a non-overlapping manner.

`Component` – Content component type, role, name, ID and time interval information. A component is present and shall be reported in the Component field only if it is presented on a Primary Device or Companion Device, or sent to a Time-shift-buffer or Long-term storage, as specified in `DestinationDeviceType` field. A component shall not be reported in the Component field if it is not presented on any Primary Device or Companion Device, nor sent to any Time-shift-buffer or Long-term storage.

`Component.componentType` – The type of component is indicated. Value of 0 shall indicate an audio component. Value of 1 shall indicate a video component. Value of 2 shall indicate a closed caption component. Value of 3 shall indicate an application component. Values 4 to 255 shall be reserved.

`Component.componentRole` – A unsigned byte that shall represent the role or kind of the component. In this case the `componentRole` attribute shall be interpreted as follows:

- For audio component (when `componentType` value above is equal to 0) values of `componentRole` shall be as defined in section "User Service Description for MMT – Semantics" of A/331 [1].
- For Video (when `componentType` value above is equal to 1) values of `componentRole` shall be as follows: 0 = Primary video, 1-254 = reserved, 255 = unknown.
- For Closed Caption component (when `componentType` value above is equal to 2) values of `componentRole` shall be as follows: 0 = Normal, 1 = Easy reader, 2-254 = reserved, 255 = unknown.
- When `componentType` value above is between 3 to 255, inclusive, the `componentRole` shall be equal to 255.

`Component.componentName` – A string representing the human-readable name of the component.

`Component.componentId` – A string representing component identifier.

`Component.componentLang` – A string representing component language.

`Component.startTime` – the UTC `dateTime` at the beginning of the event. Interval shall begin when display of this content component begins. The value shall not be less than the value of `startTime` attribute of this `reportInterval` instance.

`Component.endTime` – the UTC `dateTime` at the end of the event. Interval shall end when display of this content component ends. The value shall not be greater than the value of `endTime` attribute of this `reportInterval` instance.

`Component.SourceDeliveryPath` – Delivery path used for or the source of the content component indicated by the parent `Component` element.

`SourceDeliveryPath.type` –

0 – Broadcast delivery (content component is delivered by broadcast)

1 – Broadband delivery (content component is delivered directly by broadband by broadcaster)

2 – Time-shift-buffer source (content source is local time shift buffer)

3 – Hard-drive source (content source is local hard drive)

4 – Delivery via direct connection (HDMI)

5 – Alternate IP delivery (content component is delivered via intermediary)

6 to 255 – Reserved.

`SourceDeliveryPath.startTime` – the UTC `dateTime` at the beginning of the event. Interval shall begin when the delivery of content component begins on the path or from the source indicated by the value of `type` attribute. The value shall not be less than the value of `startTime` attribute of the parent `Component` element.

`SourceDeliveryPath.endTime` – the UTC `dateTime` at the beginning of the event. Interval shall end when the delivery of content component ends on the path or from the source indicated by the value of `type` attribute. The value shall not be greater than the value of `endTime` attribute of the parent `Component` element.

`AppInterval` – The interval for each active Application.

`AppInterval.appId` – Application identifier represented as a string. The interpretation of this field is defined by application.

`AppInterval.startTime` – The UTC `dateTime` at the beginning of the event. Intervals shall begin when display of the application begins. The value shall not be less than the value of `startTime` of this `reportInterval` instance.

`AppInterval.endTime` – The UTC `dateTime` at the end of the event. Intervals shall end when display of the application ends. The value shall not be greater than the value of `endTime` of this `reportInterval` instance.

`AppInterval.LifeCycle` – An unsigned integer denoting the application lifecycle. Defined values are:

1 – Downloaded and not launched

2 – Downloaded and auto-launched

3 – Downloaded and user-launched

4 to 99 – Reserved.

`AppInterval.Tags` – Application tag represented as a String. The interpretation of this field is defined by application..

4.2.3 Transmission of CDMs

4.2.3.1 URLs for Service Usage Data Servers

When a broadcaster wants to receive Service Usage Data Gathering reports, the URL to be used for transmitting CDMs shall be provided by the broadcaster via service signaling [1]. Details for this are specified in the A/331 specification [1].

The URL to be used for transmitting CDMs may also be delivered as a watermark payload. Details for this are specified in the A/336 [3] specification.

The URCR shall allow the same URL to be configured for one or more services. This allows the broadcaster to decide the granularity of the `destination` addresses, that is, one `destination` address URL per service, one per a set of services, one for an RF multiplex, one for a region, one for the nation. This is not explicitly signaled; rather the same URL shall be repeated for each service when the scope is broader than a single service.

4.2.3.2 CDM Transmission Protocol

When the URCR is prepared to transmit a CDM to a service usage data server, it shall issue an HTTP PUT request to the server, with the CDM in the body of the request.

4.2.3.3 CDM Transmission Frequency

The URCR shall maintain a "date of last" time record which is accessible by Applications for that service. The URCR when it is capable of transmission shall transmit at least once every 24 hours or when URCR storage allocated for CDUs has reached 80%.

4.2.3.4 Criteria for Retransmission of CDUs Due to Failure Modes

If a CDM is not successfully transmitted due to a failure mode, it should remain stored, and it should be retransmitted.

The following are some of the possible failure modes:

- CDM `destination` address unavailable
- Incorrect CDM `destination` address
- HTTP session failure

Annex A: Schema

The normative schema of the "ATSC 3.0 Service Usage Report Consumption Data Message" shall be as follows.

```
{
   "id": "http://atsc.org/version/3.0/serviceusagereporting/usagereport#",
   "$schema": "http://json-schema.org/draft-04/schema#",
   "title": "ATSC 3.0 Service Usage Report Consumption Data Message",
   "description": "Service Usage Report Consumption Data Message Schema as defined in ATSC 3.0 (c)
2015 atsc.org - All rights reserved.",
   "@context": {"CDM": "http://www.atsc.org/contexts/3.0/CDM/V1"},
   "type": "object",
   "properties": {
   "CDM": {
   "type": "object",
   "properties": {
      "protocolVersion": {
         "type": "string" , "pattern": "^0[xX][0-9a-fA-F]{2}$", "minLength": 4, "maxLength": 4
      },
      "DeviceInfo": {
      "type": "array",
      "items": {
         "type": "object",
         "properties": {
            "deviceID": {"type": "string"},
            "deviceModel": {"type": "string"},
            "deviceManufacturer": {"type": "string"},
            "deviceOS": {"type": "string"},
            "peripheralDevice": {
               "type": "string",
               "enum": ["TRUE","FALSE","NOTREPORTED"]
            },
            "deviceLocation": {
            "type": "object",
            "properties": {
               "latitude": {"type": "string"},
               "longitude": {"type": "string"}
            },
            "required": [
               "latitude",
               "longitude"
            ]
         },
         "clockSource": {"type": "integer", "minimum": 0, "maximum": 1}
         },
         "required":
["deviceID","deviceModel","deviceManufacturer","deviceOS","peripheralDevice","deviceLocation"]
   },
```

```
    "minItems": 1,
    "maxItems": 1
},
                    "AVService": {
                    "type": "array",
                    "items": {
                        "type": "object",
                        "properties": {
                        "country": {
                            "type": "string"
                        },
                            "bsid": {
                                "type": "integer"
                            },
                            "serviceID": {
                                "type": "integer"
                            },
                            "globalServiceID": {
                                "type": "string",
                                "format": "uri"
                            },
                            "serviceType": {
                                "type": "integer"
                            },
                            "reportInterval": {
                                "type": "array",
                                "items": {
                                "type": "object",
                                "properties": {
                                    "startTime": {
                                        "type": "string",
                                        "format" : "date-time"
                                    },
                                    "endTime": {
                                        "type": "string",
                                        "format" : "date-time"
                                    },
                                    "DestinationDeviceType": {
                                        "type": "integer",
                                        "minimum": 0,
                                        "maximum": 255
                                    },
                                    "ContentID": {
                                        "type": "object",

                                        "oneOf": [ {"properties": {"type": {"type": "string", "enum": ["EIDR"]},
                                        "cid": {"type": "string", "pattern": "^10\\.5240\\/([0-9a-fA-F]{4}-){5}[0-9A-Z]$",
"minLength": 34, "maxLength": 34}},"required": ["type","cid"]},
                                            {"properties": {"type": {"type": "string", "enum": ["Ad-ID"]},
                                        "cid": {"type": "string", "pattern": "^[1-9a-zA-Z]{1}[0-9a-zA-Z]{10}(H|D)?$",
"minLength": 11, "maxLength": 12}},"required": ["type","cid"]},
                                            { "properties":{"type":{"type":"string","not":{ "enum":["EIDR","Ad-
ID"] }}},"required": ["type"]}
                                        ]

                                },
```

```
    "broadcastInterval": {
"type": "array",
"items": {
    "type": "object",
    "properties": {
        "broadcastStartTime": {"type": "string","format": "date-time "},
        "broadcastEndTime": {"type": "string","format": "date-time "},
        "speed": {"type": "number"},
        "receiverStartTime": {"type": "string","format": "date-time "}
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    "receiverStartTime",
    "broadcastStartTime",
    "broadcastEndTime"]
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},
"Component": {
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    "items": {
    "type": "object",
    "properties": {
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        "minimum": 0,
        "maximum": 255
    },
        "componentRole": {
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        "minimum": 0,
        "maximum": 255
    },
    "componentName": {
        "type": "string"
    },
    "componentID": {
         "type": "string"
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        "componentLang": {
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        "startTime": {
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            "format" : "date-time"
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        "endTime": {
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            "format" : "date-time"
        },
        "SourceDeliveryPath": {
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            "type": "object",
            "properties": {
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                    "type": "integer",
                "minimum": 0,
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                                "maximum": 255
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                                },
                                "endTime": {
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                                    "format" : "date-time"
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                            "required": ["type","startTime","endTime"]
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                    "minItems": 1
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                    "items": {
                    "type": "object",
                    "properties": {
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                        "startTime": {
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                            "format" : "date-time"
                        },
                        "endTime": {
                            "type": "string",
                            "format" : "date-time"
                        },
                        "LifeCycle": {
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                            "minimum": 0,
                            "maximum": 99
                        },
                        "Tags": {"type": "string"}
                    },
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                },
                "minItems": 0
                }
},
            "required": ["startTime","endTime","DestinationDeviceType","Component"]
        },
        "minItems": 1}
    },
        "required": ["country","bsid","serviceID","serviceType","reportInterval"]
    },
    "minItems": 0
```

```
            }
        },
      "required": ["protocolVersion","DeviceInfo","AVService"],
      "additionalProperties": true
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    },
    "required": ["CDM"]
}
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– End of Document –